

POWER PLANT (PT6A-140) - ADJUSTMENT/TEST**1. General**

- A. This adjustment/test procedure outlines individual procedures to guide maintenance personnel for operating and adjusting the PT6A-140 engine. Procedures described are not necessarily in maintenance sequence; select an individual or group of procedures to meet the maintenance requirement.
- B. For engine power lever and control rigging, refer to Chapter 76, Engine Control Adjustment - Adjustment/Test and Engine Controls Rigging - Adjustment/Test.
- C. For a Table of Engine Operating Limit Data (Refer to Table 501 and Table 502).

Table 501. Table 501 PT6A-140 Engine Operating Limits

OPERATING CONDITIONS			TORQUE FOOT-POUNDS (13)		RECOMMENDED ITT °C	MAX ITT °C
POWER SETTING	SHP (1)	OAT °C	ft-lb	psi		
			Takeoff	867	39	2500 (17)
Maximum Continuous (8)	867	27	2500 (17)	46.6		825
Maximum Climb	867	27	2500 (17)	46.6	785 (15)	825
Maximum Cruise	867	16	2500 (17)	46.6	785 (16)	805
Idle			N/A			700
Starting			N/A			1090 (9)
Transient			2625 (6)			905 (8)
Maximum Reverse (10, 14)	867		2500	46.6		850

Table 502. Table 502 PT6A-140 Engine Operating Limits

OPERATING CONDITIONS			GAS GENERATOR RPM (N _g) (2)		PROPELLER RPM (N _p)		OIL PRESSURE PSIG (4)	OIL TEMP °C (5)
POWER SETTING	SHP (1)	OAT °C	RPM	%	RPM	%		
			Takeoff	867	39	38850	103.7	1900 (11)
Maximum Continuous (8)	867	27	38850	103.7	1900 (11)	100	85 to 105	32 to 99
Maximum Climb	867	27	38850	103.7	1900 (11)	100	85 to 105	32 to 99
Maximum Cruise	867	16	38850	103.7	1900 (11)	100	85 to 105	32 to 99
Idle			20607 (minimum) (12)	55 (Minimum) (12)		N/A	40 (minimum)	-40 to 99
Starting			N/A	N/A		N/A	200 (MAX)	-40 (minimum)
Transient			40000 (7)	106.8 (10)	2090 (3)	110 (12)		32 to 99

Maximum Reverse (10, 14)	867		38850	103.7	1825	96	85 to 105	32 to 99
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1. Refer to the Engine Torque For Takeoff figure of Section 5 of POH.
2. For every 10°C (18°F) below -30°C (-22°F) ambient temperature, reduce maximum allowable N_g by 2.2%.
3. 2090 Np may be employed in an emergency condition, to complete a flight, and may be employed at all ratings.
4. Normal oil pressure is 85 to 105 PSI at gas generator speeds above 72% with oil temperature between 60°C and 70°C (140°F and 185°F). Oil pressure below 85 PSI is undesirable and should be tolerated only for completion of the flight, preferably at a reduced power setting. Oil pressure below normal should be reported as an engine discrepancy and should be corrected before the next takeoff. Oil pressures below 40 PSI are unsafe and require that either the engine be shut down or a landing be made as soon as possible using the minimum power required to sustain flight.
5. Maximum transient oil temperature is 104°C for 10 minutes maximum.
6. This value is limited to 20 seconds (Reference Figure 501 sheet 3).
7. This value is limited to 20 seconds (Reference Figure 501 sheet 4).
8. This value is limited to 20 seconds (Reference Figure 501 sheet 2).
9. This value is limited to 2 seconds.
10. Reverse power operation is limited to one minute.
11. A transient fluctuation of up to +40 rpm is permitted to account for power settings accuracy and steady state fluctuations.

NOTE 1: Steady state maximum Np setting is 1900 rpm.

12. Substantiated to FAR 33.73 with a minimum in-flight gas generator speed of 65% (24354 rpm).
13. Conversion factor: Shaft Torque (ft. lb.) = 53.6 x torquemeter pressure (psid).
14. Recommended power setting values.
15. Recommended settings for constant ITT climb.
16. Recommended settings for constant ITT cruise.
17. Maximum recommended torque at 1900 RPM NP is 2397 ft.lb. (44.7 psi). Torque limits of 2500 allows operation at reduced Np at quoted power settings and is aligned with the nominal setting of the over-torque limiter. It is note recommended to operate steady-state with the over-torque limiter engaged.

2. Engine Operating Limits

- A. Observe the limitations that follow when you operate the engine. If at any time the limits are exceeded, immediately shut down the engine by placing the throttle at flight idle and the fuel condition lever in cutoff (Refer to Figure 501).

3. Idle Check

- A. Low Idle Check (Refer to Figure 501, Table 501 and Table 502).
 - (1) Start engine, observing all operating limitations. Refer to Pilot's Operating Handbook and Approved Flight Manual.
 - (a) Operate engine at idle for five minutes, allowing temperatures to stabilize.
 - (b) Advance power lever as required to get between 55.5 and 57 percent N_g .
 - (2) Position generator switch to ON and adjust electrical load to 40 Amperes.
 - (3) Position BLEED AIR HEAT switch to ON.
 - (4) Rotate CABIN HEAT TEMP control to full HOT.
 - (5) Position fuel condition control lever to LOW IDLE.
 - (6) Position power control lever to IDLE position, forward and against detent gate.
 - (7) If the percent N_g is not between 55.5 and 57 percent N_g refer to Chapter 76 Engine Control Adjustment - Adjustment/Test Low Idle Adjustment.
- B. High Idle Check (Refer to Figure 501, Table 501 and Table 502).
 - (1) Start engine, observing all operating limitations. Refer to Pilot's Operating Handbook and Approved Flight Manual.
 - (a) Operate engine at idle for five minutes, allowing temperatures to stabilize.
 - (b) Advance power lever as required to get between 64 and 66 percent N_g .
 - (2) Position generator switch to ON and adjust electrical load to 40 Amperes.
 - (3) Position BLEED AIR HEAT switch to ON.

- (4) Rotate CABIN HEAT TEMP control to full HOT.
- (5) Position fuel condition control lever to LOW IDLE.
- (6) Position power control lever to IDLE position, forward and against detent gate.
- (7) If the percent N_g is not between 64.00 and 66.00 percent N_g refer to Chapter 76 Engine Control Adjustment - Adjustment/Test High Idle Adjustment.

4. Maximum Torque and Acceleration Check

- A. Do the Maximum Torque and Acceleration Check (Refer to Figure 501, Table 501 and Table 502).
- (1) Start engine in accordance with Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Operate engine at idle for five minutes to allow temperatures to stabilize.
 - (2) Set the propeller speed lever to MAX and slowly advance power.
 - (a) If necessary, mark the lever position where you have 2397 foot-pounds of torque.
 - (3) Allow the engine to stabilize at maximum power (2397 foot-pounds of torque) for 1 min.
 - (a) Record all engine parameters.
 - (b) Return the power lever to IDLE.
 - (4) Set the levers are as follows:
 - (a) The power lever is set to IDLE
 - (b) The fuel condition lever is set to HIGH IDLE.
 - (c) The propeller lever is set to MAX.
 - (5) Let the engine stabilize, then move the Power Control lever rapidly, in less than one second, to Take Off.

NOTE: The engine must accelerate and respond without hesitation or surge. If requirements are not met, check the P3 filter and the forward air tube for contamination or blockage. Clean as necessary.
 - (6) Refer to the Pratt & Whitney Canada Maintenance Manual P/N 3075742, found in the Introduction List of Publications for the correct acceleration time.
 - (7) Shut down the engine. Refer to Pilot's Operating Handbook and Approved Flight Manual.

5. Propeller Overspeed Governor Check

- A. Do the Propeller Overspeed Governor Check.
- (1) Start engine in accordance with Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Operate engine at idle for five minutes to allow temperatures to stabilize.
 - (2) Set the propeller lever at the MAX PROP RPM position.
 - (3) Set the power lever at the IDLE position.
 - (4) At the lower left instrument panel, push and hold the Overspeed Governor Push to Test Switch (SI006).
 - (5) Advance the power lever slowly until propeller RPM stabilizes.
 - (a) Make sure that the rpm is 1760 to 1810 rpm (1730 to 1800 rpm for airplanes 208B5000 and on).
 - (b) Record the stabilized rpm.
 - (6) Reduce the power lever position until propeller RPM is below governing speed.
 - (7) Release the Overspeed Governor test switch.
 - (8) Shut down the engine. Refer to Pilot's Operating Handbook and Approved Flight Manual.

6. Propeller Lever Adjustment Check

- A. Do the Propeller Overspeed Governor Check (Refer to Figure 501, Table 501 and Table 502).
- (1) Start engine in accordance with Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Operate engine at idle for five minutes to allow temperatures to stabilize.
 - (2) Set the propeller lever at the MAX PROP RPM position.
 - (3) Move the power lever until you get 1900 rpm + 10 to -10 rpm.
 - (4) Slowly move the propeller lever back until you get the minimum propeller rpm.
 - (a) Record the maximum propeller rpm.

- (5) Set the power lever to the IDLE position.
- (6) Shut down the engine. Refer to Pilot's Operating Handbook and Approved Flight Manual.

7. Reverse Power Check

- A. Do the Reverse Power Check (Refer to Figure 501, Table 501 and Table 502).

WARNING: Make sure you are careful when applying reverse thrust. Improper elevator position and/or hard braking during reverse motion can cause the airplane to tip onto its tail.

- (1) Start engine in accordance with Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Operate engine at idle for five minutes to allow temperatures to stabilize.
- (2) Move the power lever to the Beta range and then slowly move it towards MAX REVERSE position.
 - (a) Monitor the gas generator rpm % (N_g) and the propeller rpm (N_p).
 - (b) If necessary, mark the power lever positions where you have N_p and N_g starts to increase.

CAUTION: Too much engine reverse operation can cause component damage. You must limit the reverse thrust time to 60 seconds.

- (3) Set the power lever to the MAX REVERSE position.
 - (a) Record the engine parameters.
- (4) Shut down the engine. Refer to Pilot's Operating Handbook and Approved Flight Manual.

8. Emergency Power Lever Check

- A. Do the Emergency Power Lever Check (Refer to Figure 501, Table 501 and Table 502).

- (1) Start engine in accordance with Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Operate engine at idle for five minutes to allow temperatures to stabilize.
- (2) Set the power lever to the IDLE position the prop lever at MAX and the condition lever at LOW IDLE.
- (3) Set the prop lever to the MAX position.
- (4) Set the fuel condition lever to the LOW IDLE position.

CAUTION: Do not increase the N_g speed at a rate of more than 4% per second. Engine surge, over-temperature, over-speed or over-torque can occur if the engine speed is increased too quickly.

- (5) Monitor the ITT, torque, and N_g speed at all times as you slowly move the emergency power lever forward until the N_g increases to 15% more than ground idle speed.
 - (a) Make sure you do not have more than 2397 foot-pounds of torque.
 - (b) Record the maximum power you monitored.
- (6) Move the emergency power lever to the NORMAL position.
- (7) Shut down the engine. Refer to Pilot's Operating Handbook and Approved Flight Manual.

9. PWR LVR CAS Message Check

- A. Do the PWR LVR CAS Message Check.

- (1) Shut down the engine. Refer to Pilot's Operating Handbook and Approved Flight Manual.
- (2) Move the EMERGENCY POWER lever out of the NORMAL position.
 - (a) Make sure that the EMERG PWR LVR CAS message shows on the Primary Flight Display CAS message window.
- (3) Slowly move the EMERGENCY POWER lever back to the NORMAL position.
 - (a) Make sure that the EMERG PWR LVR CAS message goes off.
 - (b) If necessary, mark the position the CAS message goes off.

10. Engine Performance Check

- A. Do the Engine Performance Check.

CAUTION: Do not exceed the engine operating limits shown in Table 501 and Table 502 during the engine performance check procedure. Failure to obey these limits will result in damage to the engine.

NOTE: This test is to be completed when referenced by the Engine Manufacturers Maintenance Manual or when the engine, propeller governor or propeller reversing linkage is installed or replaced.

- (1) Find the ambient air temperature at the time the ground power check is started.
- (2) Use the airplane altimeter (set at 29.92 in. Hg) to find the field barometric pressure (not corrected to sea level).
- (3) Start the engine in accordance with Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
- (4) Operate engine at idle for five minutes to allow temperatures to stabilize.
- (5) Use the Propeller Control Lever to set the propeller speed to 1900 RPM.
- (6) Slowly move the Power Lever forward until the torque indicated is at the value shown in Table 503 and Figure 502 for the altitude and temperature selected at the start of the check procedure.

Table 503. Table 503 PT6A-140 Engine Performance Check Chart

Altitude (at 29.92 in. Hg)	Ambient Temperature	Torque (ft-lbs)	Fuel Flow (pph)	N _G	ITT
0 feet (0 m)	-40°F (-40°C)	2396	537	92.5%	1162°F (628°C)
	-22°F (-30°C)	2396	543	94.0%	1218°F (659°C)
	-4°F (-20°C)	2397	548	95.5%	1274°F (690°C)
	14°F (-10°C)	2396	554	97.0%	1328°F (720°C)
	32°F (0°C)	2395	560	98.5%	1384°F (751°C)
	50°F (10°C)	2397	566	99.9%	1438°F (781°C)
	68°F (20°C)	2397	572	101.3%	1492°F (811°C)
	86°F (30°C)	2397	578	102.7%	1546°F (841°C)
	104°F (40°C)	2203	548	102.6%	1555°F (846°C)
	122°F (50°C)	2006	518	102.3%	1562°F (850°C)
	140°F (60°C)	1767	482	101.7%	1567°F (853°C)
2000 feet (609.6 m)	-40°F (-40°C)	2396	531	93.7%	1202°F (650°C)
	-22°F (-30°C)	2396	536	95.3%	1260°F (682°C)
	-4°F (-20°C)	2396	541	96.8%	1315°F (713°C)
	14°F (-10°C)	2396	547	98.3%	1369°F (743°C)
	32°F (0°C)	2396	553	99.8%	1425°F (774°C)
	50°F (10°C)	2397	558	101.3%	1481°F (805°C)
	68°F (20°C)	2396	564	102.7%	1535°F (835°C)
	86°F (30°C)	2240	541	102.9%	1551°F (844°C)
	104°F (40°C)	2040	509	102.5%	1557°F (847°C)
	122°F (50°C)	1853	480	102.2%	1560°F (849°C)
	140°F (60°C)	1621	446	101.5%	1566°F (852°C)
4000 feet (1219.2 m)	-40°F (-40°C)	2396	522	95.1%	1249°F (676°C)
	-22°F (-30°C)	2396	528	96.7%	1305°F (707°C)
	-4°F (-20°C)	2396	535	98.2%	1360°F (738°C)
	14°F (-10°C)	2397	542	99.7%	1416°F (769°C)
	32°F (0°C)	2397	547	101.2%	1474°F (801°C)
	50°F (10°C)	2397	553	102.7%	1530°F (832°C)
	68°F (20°C)	2257	531	103.0%	1546°F (841°C)
	86°F (30°C)	2066	501	102.7%	1551°F (844°C)
	104°F (40°C)	1883	472	102.4%	1555°F (846°C)
	122°F (50°C)	1705	444	102.0%	1558°F (848°C)

	140°F (60°C)	1480	411	101.2%	1564°F (851°C)
6000 feet (1828.8 m)	-40°F (-40°C)	2397	520	96.7%	1301°F (705°C)
	-22°F (-30°C)	2397	524	98.3%	1359°F (737°C)
	-4°F (-20°C)	2396	529	99.8%	1416°F (769°C)
	14°F (-10°C)	2398	535	101.3%	1474°F (801°C)
	32°F (0°C)	2397	541	102.8%	1531°F (833°C)
	50°F (10°C)	2249	520	103.0%	1540°F (838°C)
	68°F (20°C)	2080	492	102.9%	1546°F (841°C)
	86°F (30°C)	1905	465	102.7%	1551°F (844°C)
	104°F (40°C)	1733	438	102.3%	1557°F (847°C)
	122°F (50°C)	1568	411	101.9%	1558°F (848°C)
	140°F (60°C)	1355	380	101.1%	1564°F (851°C)
8000 feet (2438.4 m)	-40°F (-40°C)	2396	543	98.7%	1371°F (744°C)
	-22°F (-30°C)	2397	543	100.3%	1429°F (776°C)
	-4°F (-20°C)	2395	544	101.8%	1486°F (808°C)
	14°F (-10°C)	2398	546	103.3%	1544°F (840°C)
	32°F (0°C)	2220	504	102.8%	1537°F (836°C)
	50°F (10°C)	2073	482	102.9%	1542°F (839°C)
	68°F (20°C)	1916	457	102.8%	1548°F (842°C)
	86°F (30°C)	1751	430	102.5%	1553°F (845°C)
	104°F (40°C)	1594	406	102.2%	1558°F (848°C)
	122°F (50°C)	1443	382	101.8%	1562°F (850°C)
	140°F (60°C)	1246	353	101.0%	1566°F (852°C)
10,000 feet (3048 m)	-40°F (-40°C)	2398	560	101.1%	1461°F (794°C)
	-22°F (-30°C)	2398	564	102.7%	1521°F (827°C)
	-4°F (-20°C)	2344	550	103.5%	1549°F (843°C)
	14°F (-10°C)	2196	500	103.1%	1540°F (838°C)
	32°F (0°C)	2044	467	102.7%	1539°F (837°C)
	50°F (10°C)	1907	447	102.8%	1544°F (840°C)
	68°F (20°C)	1762	423	102.7%	1549°F (843°C)
	86°F (30°C)	1609	398	102.4%	1553°F (845°C)
	104°F (40°C)	1465	376	102.1%	1560°F (849°C)
	122°F (50°C)	1327	354	101.8%	1564°F (851°C)
	140°F (60°C)	1142	327	100.9%	1569°F (854°C)

(a) Let the engine instrumentation stabilize.

- (7) Record the Fuel Flow, N_g speed and ITT values shown on the engine instrumentation.
- (8) Set the power lever to the IDLE position.
- (9) Slowly move the propeller lever to the MIN position.
- (10) Make sure the recorded fuel flow is not more than 15 lbs/hr higher than the value shown in Table 503.
- (11) Make sure the recorded ITT is less than the limitation shown in Table 501.
- (12) Shut down the engine. Refer to Pilot's Operating Handbook and Approved Flight Manual.

Figure 501 : Sheet 1 : PT6A-140 Engine Operating Limits

A90661

- AREA A** DO A VISUAL INSPECTION THROUGH EXHAUST DUCT AND RECORD IN LOG BOOK.
- AREA B** DO A HOT SECTION INSPECTION.
- AREA C** SEND ENGINE TO AN APPROVED OVERHAUL FACILITY FOR INSPECTION/REPAIR.

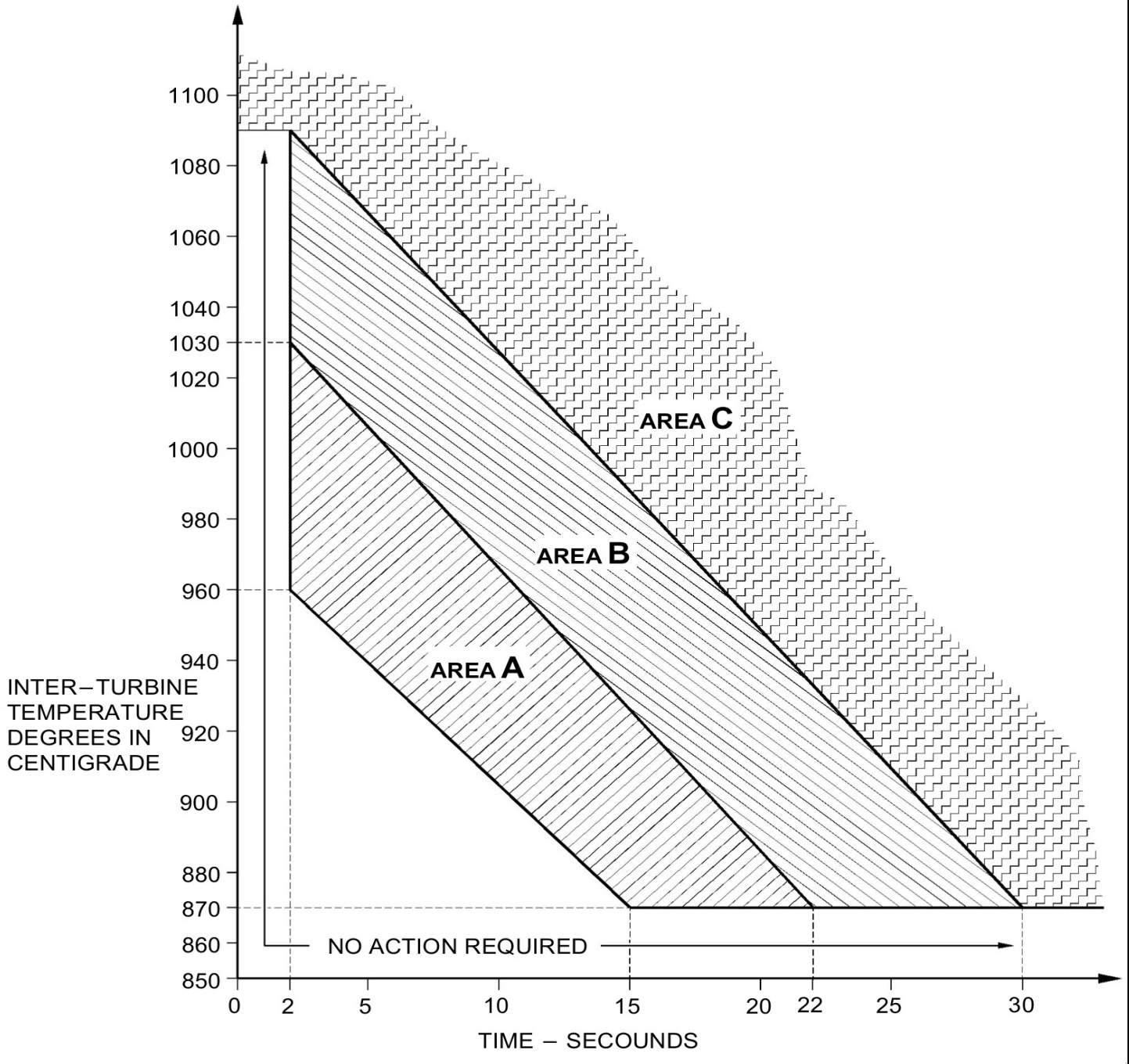


Figure 501 : Sheet 2 : PT6A-140 Engine Operating Limits

A90662

- AREA A** FIND A CAUSE OF THE OVERTEMPERATURE. RECORD IN LOGBOOK.
- AREA B** DO A HOT SECTION INSPECTION.
- AREA C** RETURN THE ENGINE TO AN APPROVED OVERHAUL FACILITY FOR LIGHT OVERHAUL.

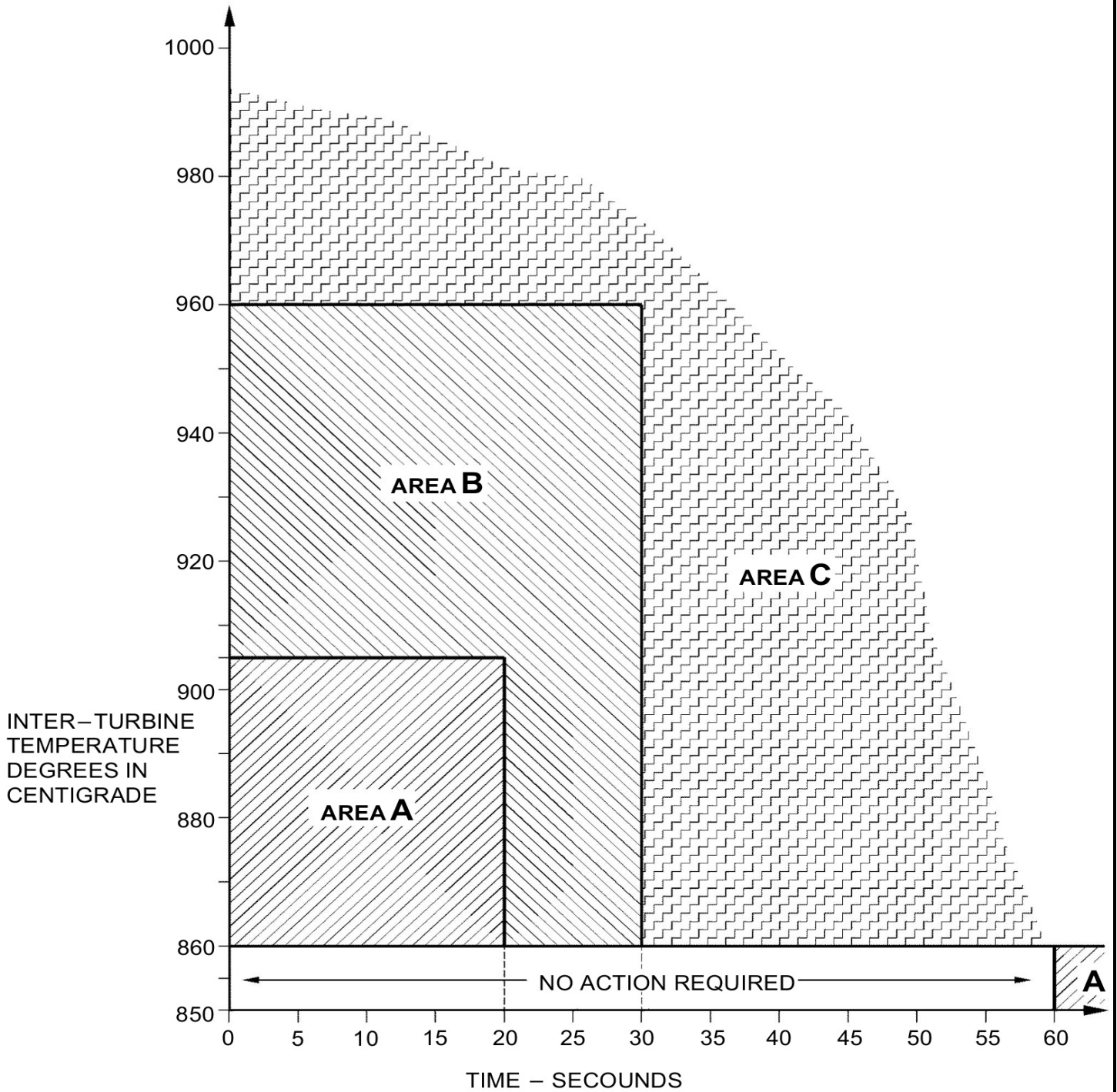


Figure 501 : Sheet 3 : PT6A-140 Engine Operating Limits

A90663

- AREA A - NO ACTION REQUIRED
- AREA B - DETERMINE AND CORRECT CAUSE OF OVERTORQUE AND RECORD IN ENGINE LOGBOOK.
- AREA C - INVESTIGATE AND CORRECT CAUSE OF OVERTORQUE.
- DO MAINTENANCE SPECIFIED IN THE MAINTENANCE MANUAL FOR UNSCHEDULED INSPECTION OVERTORQUE.
- RECORD IN ENGINE LOG BOOK.
- AREA D - RETURN ENGINE TO AN APPROVED OVERHAUL FACILITY.

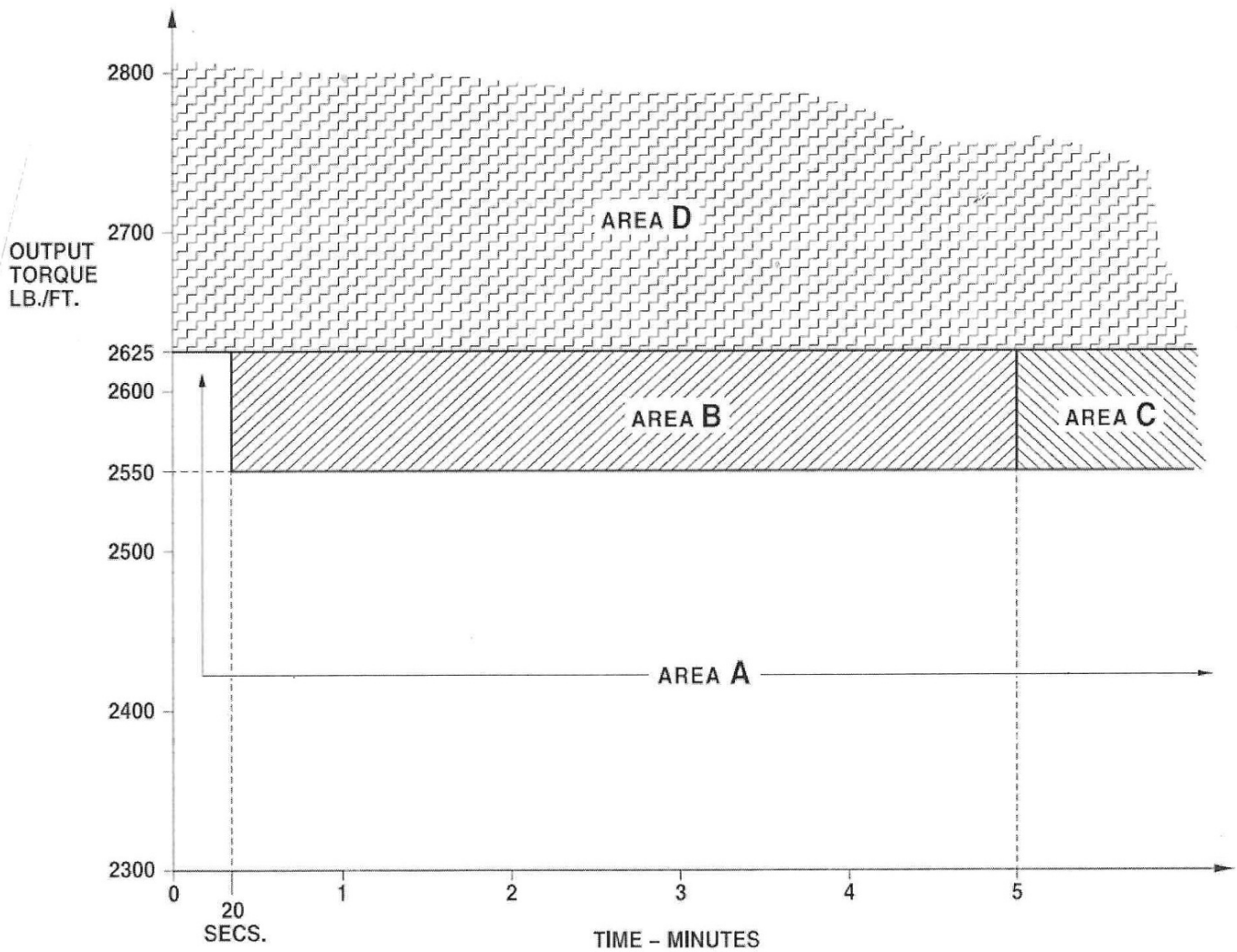


Figure 501 : Sheet 4 : PT6A-140 Engine Operating Limits

A90664

AREA A FIND AND CORRECT THE CAUSE OF THE GAS GENERATOR Ng OVERSPEED. RECORD IN ENGINE LOGBOOK.

AREA B SHIP ENGINE TO AN APPROVED OVERHAUL FACILITY FOR LIGHT OVERHAUL.

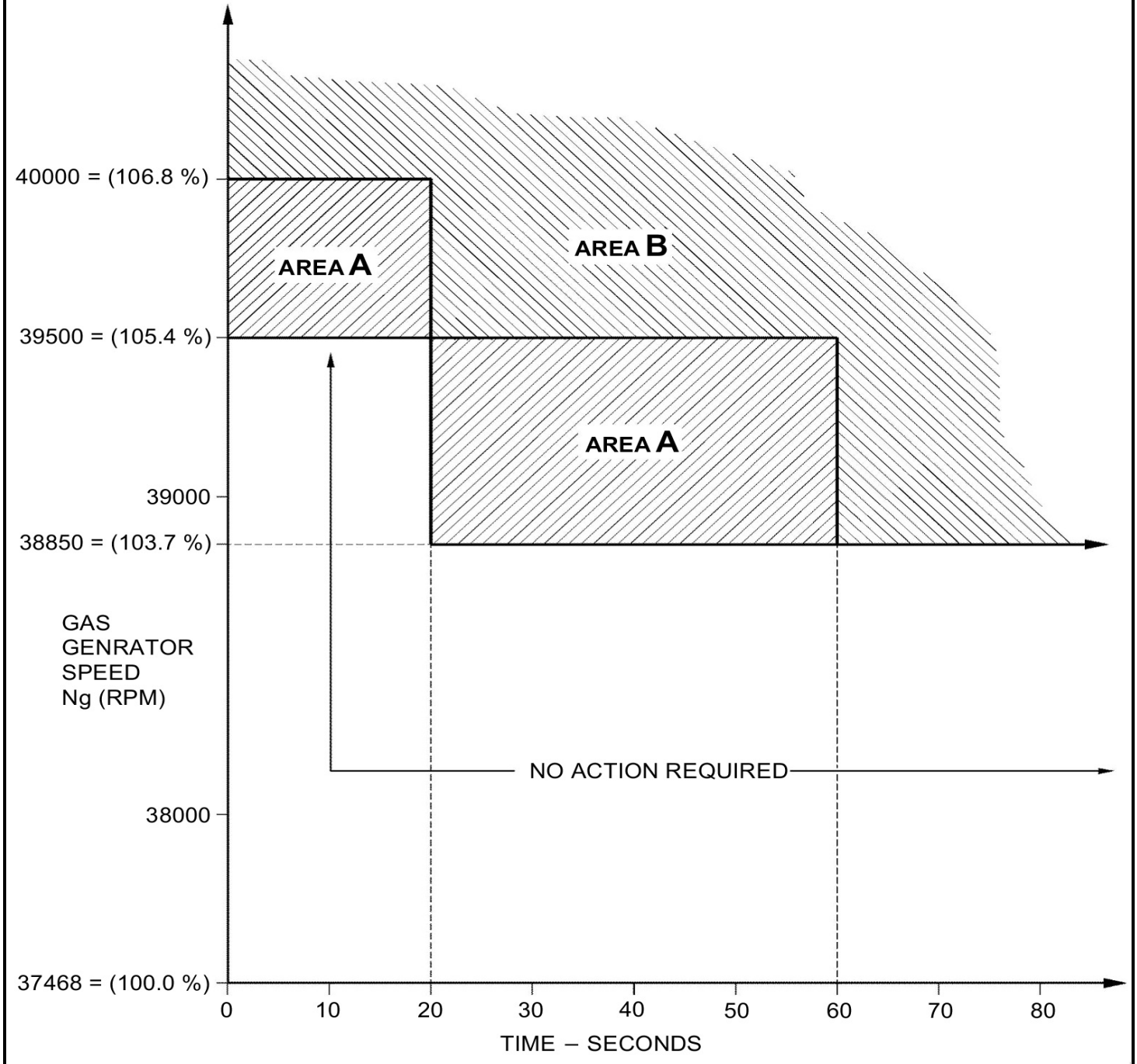


Figure 501 : Sheet 5 : PT6A-140 Engine Operating Limits

A90665

AREA A NO ACTION REQUIRED.

AREA B NO ACTION REQUIRED.
 TRANSIENT FLUCTUATIONS UP TO 1940 Ng IS PERMITTED TO ACCOUNT FOR POWER SETTING ACCURACY AND STEADY STATE FLUCTUATIONS WHEN SETTING TO MAX. Ng STEADY STATE SPEED OF 1900 RPM.
 STEADY STATE OPERATION IN THIS AREA IS NOT PERMITTED.

AREA C FIND AND CORRECT THE CAUSE OF THE POWER SECTION Ng EXCEEDANCE.
 RECORD THE EVENT IN THE LOG BOOK.
 VISUALLY INSPECT P.T. BLADES AND CHECK FOR RUBS.
 INSPECT CHIP DETECTOR, OIL STRAINER AND OIL FILTER.
 TURN PROPELLER BY HAND AND LISTEN FOR UNUSUAL NOISE.
 RUN 80% T.O. POWER FOR 10 MINUTES.
 REMOVE AND INSPECT CHIP DETECTOR, OIL STRAINER AND MAIN OIL FILTER.

AREA D REMOVE AND SHIP THE ENGINE TO AN APPROVED OVERHAUL FACILITY FOR LIGHT OVERHAUL INSPECTION FOR Ng OVERSPEED.

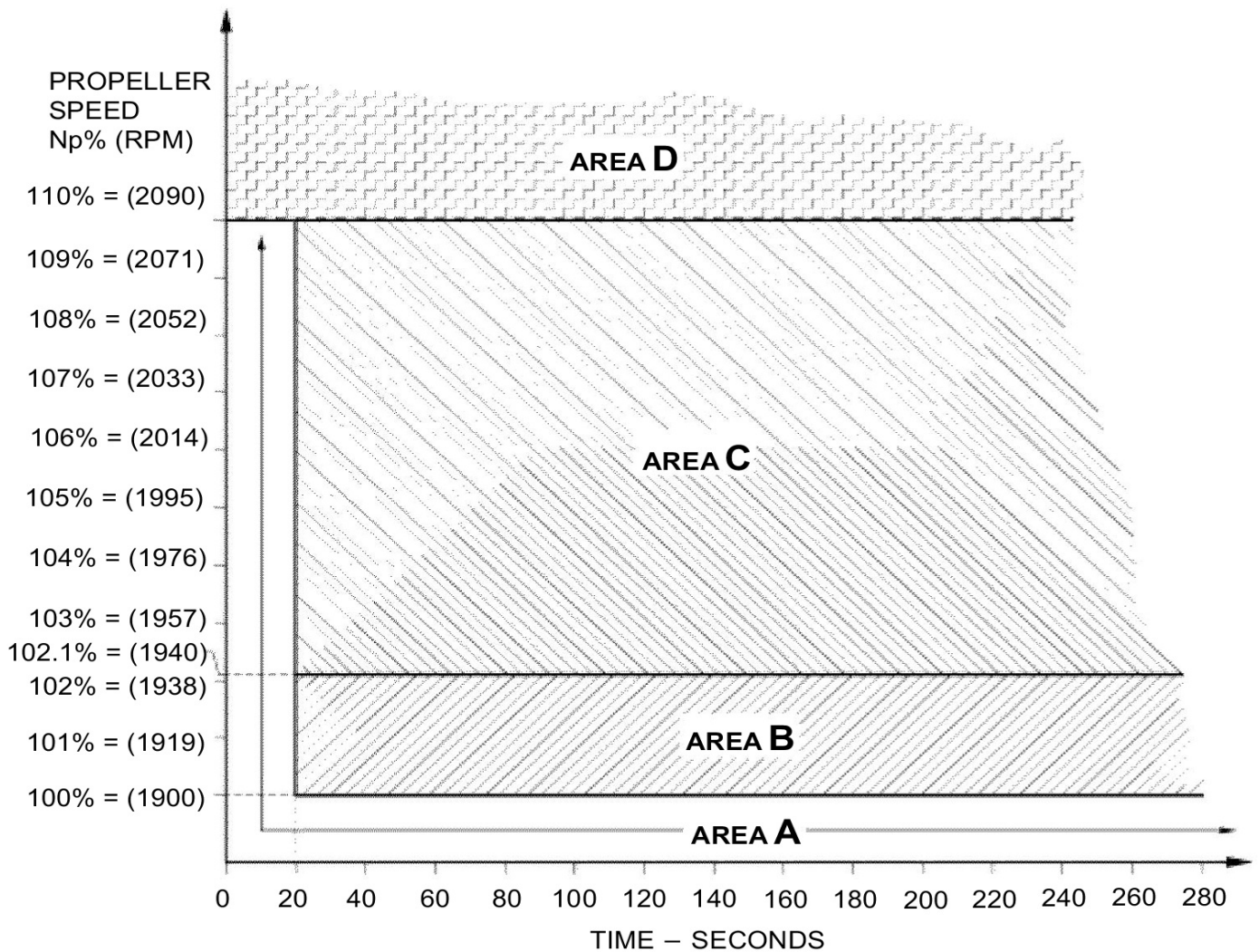


Figure 502 : Sheet 1 : Ground Power Check Chart

